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## ACKNOWLEDGEMENTS

This guide was made possible by the [Federal Emergency Management Agency](#) (FEMA) [Hazard Mitigation Grant Program](#), project 1005-47, and was administered by the [Governor's Office of Emergency Services](#) (OES). We would like to express our appreciation to FEMA and OES for their support.

This Guide was developed as a cooperative effort by the [University of California Forest Products Laboratory](#) and the Fire Hazard Zoning Working Group comprised of representatives from the [United States Forest Service](#) (USDAFS), [Bureau of Land Management](#) (BLM), [California Department of Forestry and Fire Protection](#) (CDF), and other interested individuals.

Special thanks should be given to the following individuals for their assistance:

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- Carol L. Rice, President, Wildland Resource Management Inc.
- Melissa Frago, Research and Writing Consultant
- Jeannie Smith, Deputy State Fire Marshal, CDF/Office of the State Fire Marshal, Fire Engineering

## FOREWORD

In the twenty-five year period of 1955 through 1979 there were 2,408 structures lost to wildfire, yet in the fourteen years following (1980-1993) over three times as many structures (7,698) were lost. From 1990 through 1999, 6,309 structures were lost to wildfires in just nine events. This clearly demonstrates the changing makeup of the wildlands in California. 954 structures, 174 of which were homes, were lost during the 1999 fire season in Shasta County. This demonstrates that the potential for disaster exists. Because of that potential, this study was undertaken.

Fire hazard assessment and zoning have been an issue in California since before the 1961 Bel Air fire, and following each disaster there are usually a number of legislative proposals designed to mitigate the next disaster. Yet despite these new laws, disasters continue to occur. The last significant disaster (before 1999) was the Southern California firestorm of 1993, and additional legislation was enacted shortly thereafter. The appendix of this report contains copies of many of the more significant statutes affecting assessment, zoning and mitigation.

The objective of this *Fire Hazard Zoning Field Guide* is to provide accurate and updated information to CDF Ranger Units, local fire districts and land use planners about the sensitive issues of fire hazard assessment and zoning. It is hoped that as public awareness increases, local agencies and residents alike will recognize their responsibility to support and participate in the implementation of pre-fire safety strategies. Strong public backing and sound long-term planning can help Californians effectively protect residents from fire in the Urban-Wildland Interface.

The California Department of Forestry and Fire Protection hopes this document will be well used to help enhance pre-fire management and minimize damage to developments in the [Urban-Wildland Interface](#). Users should copy graphics, quote regulations, etc. to expand the use of the information contained here.

**[This document contains several hyperlinks to other documents and on-line sources of information about structural fire prevention and protection, to assist users in obtaining additional information.](#)**

## 1. INTRODUCTION

The objective of publishing and distributing this Guide is to help reduce and prevent losses of life, property and natural resources from wildfire in the Urban-Wildland Interface. Loss reduction can be achieved partly through proper implementation and enforcement of fire hazard zoning and mitigation laws. This document discusses those types of laws that are state mandated.

Fire hazard zoning is one of the first steps in a comprehensive land use plan. It can also help local agencies to educate the public about wildfire hazards. By zoning fire hazards, policy makers acknowledge that there is a wildfire problem in the area that needs to be mitigated. This is also a way to make the public aware that they need to take certain measures in order to protect themselves from losses. These measures cannot be carried out without the cooperation and support of the community. Even though homeowners may want to choose for themselves how or even if mitigation should be undertaken, the minimum fire safe standards discussed here are laws, and there is a demonstrated need for their implementation and enforcement. In learning why fire hazard zoning is important to them, the public can realize that the prime responsibilities—and opportunities—for hazard mitigation are theirs. This public support of fire hazard zoning and mitigation practices can help in many ways, especially by addressing certain problems and concerns prior to implementation.

This Guide covers fire hazard zoning in the state of California, in both [State Responsibility Area](#) (SRA) and [Local Responsibility Area](#) (LRA) lands. It discusses how and why state mandated fire hazard zoning and mitigation strategies have been enacted, and it attempts to clarify some aspects of the process about which questions have often been raised. This Guide also described various [fire hazard assessment](#) and [classification](#) systems that can be used in California by local agencies or other entities. This Guide will be a tool for fire agency personnel and local land use planners who are involved in the creation and implementation of local fire hazard zoning strategies, including 1) assessment of hazards, 2) mapping options, 3) drafting of ordinances, 4) engaging community support, 5) funding options, 6) enforcement, and 7) standards and regulations.

The uses for fire hazard zoning are many. Once fire hazards have been classified, zoning allows local planners to implement land use standards that agree with the state legislature's mandates. These standards can apply to various aspects of land use, including but not limited to 1) [structural components](#) such as roofing, 2) [defensible space](#) standards such as vegetative clearance around structures, 3) [infrastructure](#) such as fire apparatus access and water supplies, and 4) preventative [land use planning](#) such as greenbelts and fuel breaks. Fire hazard zoning is also an effective tool for [public education](#) and awareness. By publicizing fire hazard zoning information, local planners can help educate property owners about their values at risk from wildfire and the options available to them for reducing hazards.

Information about [Natural Hazard Disclosure](#) (NHD) in the SRA and the LRA is also covered in this Guide, as it is closely related to fire hazard zoning. As a result, this Guide may be of use to real estate agents and disclosure firms that should be abreast of these regulations. It is also useful for fire agency personnel to be informed about NHD since related questions may arise from local property owners.

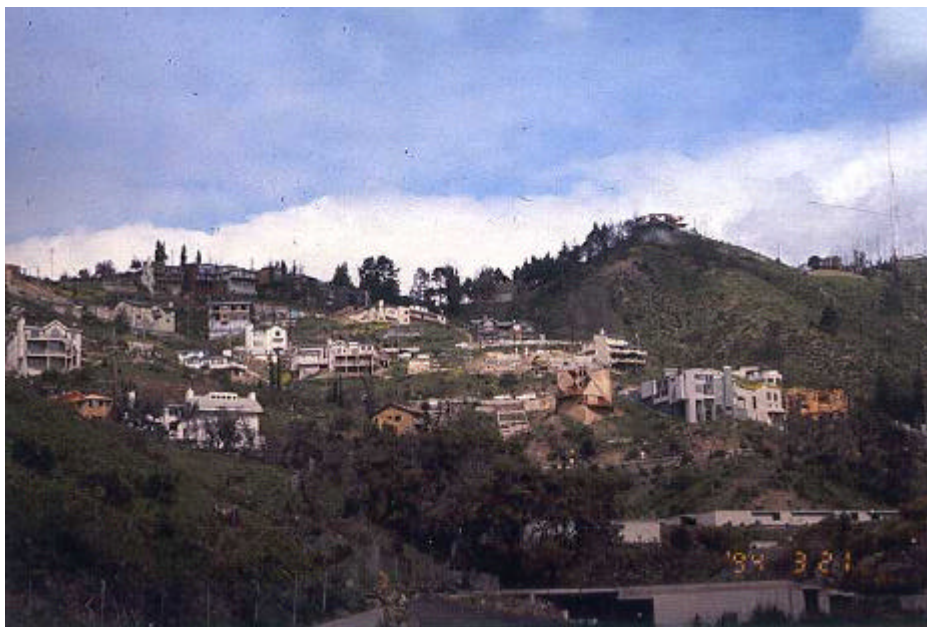
It is now the responsibility of local planners and those who implement fire safe regulations to apply these strategies using common sense. This guide will assist in implementation and help promote positive action.

## 2. URBAN-WILDLAND INTERFACE

### 2.1 Analysis of the Problem

Rural and wildland development has continuously and increasingly impacted wildland fire protection in interface areas. When structures that lack built-in fire protection—such as defensible space—burn, California Department of Forestry and Fire Protection ([CDF](#)) fire suppression apparatus and personnel need to be diverted from their primary purpose—natural resource protection—in order to protect structures at risk. The results of this diversion can be more acres burned, higher natural resource losses, and greater fire protection and rehabilitation expenses incurred. Additionally, more homes can be destroyed, and more lives are lost or put at risk.

Historically, the state has taken responsibility for wildland fire protection, while local agencies govern land use planning and development. Partly because of this separation of authority, areas known today as the [Urban-Wildland Interface](#) have continued to grow. Such an increase in the number of dwellings intermingled with wildland fuels has created statewide wildfire problems. This increase in the number of dwellings creates an additional level of risk, by concentrating flammable fuels into relatively small areas, depending on the density of developments.



**Figure 2.1 – Urban Wildland Interface, Dense Development**

### 2.2 Special Fire Problems

Wildfire is part of California's normal ecological processes, acting as both a benefit and a detriment to our natural resources. When people recreate in and develop mountainous, forest and brush-covered lands, however, wildfires become a threat to public safety, life and property. Combined with California's

Mediterranean climate—wet, warm winters that promote vegetative growth and hot, dry summers that make the growth highly flammable—recreation and development in the Urban-Wildland Interface can be dangerous. These threats are special problems in California that have vexed lawmakers, firefighters, planners and residents for many years. Repeated efforts at state and local levels have shown some benefits, but have far from erased the wildfire problems faced by many Californians. Much has yet to be done to curb the tide of destruction.



**Figure 2.2 – Aerial View of Oakland/Berkeley Hills Tunnel Fire (1991)**

People's interaction with this disturbance-driven ecosystem has led to decades of [disastrous conflagrations](#). Early in the 20<sup>th</sup> century, even wildfires that encroached on populated areas did not tend to consume a large number of houses. Since the density of development in these areas has significantly increased over the last few decades, fires that otherwise may have burned out are destroying, and even being fueled by, structures and other elements of development. For example, the most severe individual Urban-Wildland Interface fire yet experienced in California was the Oakland/Berkeley Hills Tunnel Fire in October of 1991. The devastation can be seen and felt in the photograph shown above. The statistics for this fire indicate that over 2,900 structures were damaged or destroyed—most within a few hours—and 25 people perished, including both firefighters and civilians.

Lack of defensible space and fire safe infrastructure such as roads accessible by fire equipment and evacuees, contributed greatly to the losses in this fire. In a situation like this, fire crews can not defend every threatened structure. Sound measures must be taken to protect life and property before fires start. Since not every residence can be protected by firefighters, state and local governments must help the people help themselves. One way to do this is through [fire engineering](#), which provides such benefits as licensing, product evaluation, hazardous materials and pipeline safety, fire safe planning, and collection and analysis of fire-related data for improvement of existing regulations, and for creation of new, performance based codes. [Enforcement](#) of such pre-fire zoning and hazard mitigation regulations also contributes to public safety. Another way to help people is through [education](#) of the public about the importance of such laws and the options available to help make our homes and our [communities more fire safe](#).



### 3. FIRE HAZARD ZONING

#### 3.1 Background

Wildfire is a standard occurrence in California. It occurs with regular frequency, and can be most hazardous when combined with unawareness or denial by the public and/or policy makers. As long as history has been recorded, there have been reports of large conflagrations that affect residents. Lawmakers, planners and developers are all aware of the risks associated with developing the wild lands for residential and commercial usage. Residents, in some cases, are also aware of these risks. It seems, however, that many do not realize the level of responsibility they must assume for their own safety, because firefighters can not possibly protect every structure when a wildfire approaches. People might think, “The fire department will protect my home and family if we are in danger from wildfire,” but this view can be harmful or fatal. Fire prevention and protection agencies often work at maximum capacity to protect life, property and natural resources. But people who live in hazardous areas must also rely on the pre-fire strategies available to them for protection from wildfires. Those who do use these strategies will be at the lowest risk of destruction and the highest probability for intervention by firefighters and survival from a fire threat.



**Figure 3.1 – Effective Defensible Space around a Structure**

Fire hazard zoning is important to Californians, since the threat of wildfire is very real. The CDF firefighters, fire engines and aircraft respond to an average of 7,500 wildland fires per year, and over 1500 structures were destroyed by wildfires in 1999 alone. Fire hazard zoning can tell Californians where wildfire and other natural hazards exist. Similarly, planners and developers should responsibly consider such hazards when building in hazardous areas. State and local governments have a responsibility to public safety, and wildfire is a central issue in many jurisdictions. A useful definition for fire hazard zoning is: “A *planning and regulatory activity (typically conducted by a local agency such as a city or county) which provides criteria for what kinds, how many and under what conditions development or other activities should be regulated in areas of various hazard classifications*” (Harrell 1999).



Hazard identification (or [assessment](#)), [classification](#) and [zoning](#) are three distinct processes for purposes of this guide. It is important that the distinctions between these processes be clear to local planners and fire agencies. Assessment, classification and zoning of fire hazards can be used for several purposes, but they are most important for recognizing, delineating and mitigating such hazards. They are also effective tools for bringing fire safety issues into the public eye.

### **3.2 STATE LAND USE PLANNING RESPONSIBILITIES**

*“The board shall classify all lands within the state, without regard to any classification of lands made by or for any federal agency or purpose, for the purpose of determining areas in which the financial responsibility of preventing and suppressing fires is primarily the responsibility of the state. The prevention and suppression of fires in all areas that are not so classified is primarily the responsibility of local or federal agencies, as the case may be.”* (Public Resources Code § 4125(a))

*“It is the intent of the Legislature that decisions affecting the use of land in state responsibility areas result in land uses which protect life, property, and natural resources from unreasonable risks associated with wild land fires.”* (Public Resources Code § 4128.5(a))

These sections of the [Public Resources Code](#) (PRC) clearly show that lands classified SRA for fire protection must also be developed in such a way as to help protect the public from wildfire risks. This need requires state and local agencies to cooperate in this regard, since CDF can make recommendations but does not dictate local land use planning decisions. Local governments ultimately decide what local actions will be.

#### **3.2a. Hazard Assessment and Classification**

[PRC Sections 4201-4204](#) were enacted statewide in 1982 after fires in San Bernardino, Napa, and Los Angeles Counties destroyed over 500 structures between 1980 and 1982. These sections required that the CDF classify all SRA lands into fire hazard severity zones according to the severity of fire hazards determined to exist in various areas. The purpose of this requirement was to identify measures to retard the rate of wildfire spread, and to reduce the potential intensity of wildfires that could destroy resources, life, and property. By law, the zones must embrace relatively homogenous lands, and the fire hazard severity rating must be based on [fuel loading](#), [slope](#), [fire weather](#), and [other relevant factors](#).

#### **3.2b. Public Notification**

For SRA fire hazard severity assessment, once those hazards have been identified by CDF, the information about hazards is transmitted to local governments. The public should be notified of the findings via public hearings and other local means. Maps containing the hazard severity information determined by CDF can be purchased by the public through [Teale Data Center](#). On the next page is a copy of an SRA fire hazard severity map.

#### **3.2c. Designation of Hazard Areas**

*“No designation of a zone and assignment of a rating shall be adopted by the director until the proposed regulation has been transmitted to the board of supervisors of the county in which the zone is located at least 45 days prior to the adoption of the proposed regulation and a public hearing has been held in that county during that 45-day period.”* (PRC 4203(b))

Even though CDF is responsible to identify hazards and assign severity ratings, it does not usually decide how those hazards will be dealt with. Local governments and other parties who choose to involve themselves with public hearings will determine whether or not and how wildfire hazards will be mitigated. Generating public support and playing an active role in public hearings can be an effective way for fire service personnel and other concerned citizens to help acknowledge and affect the need for fire safe standards.

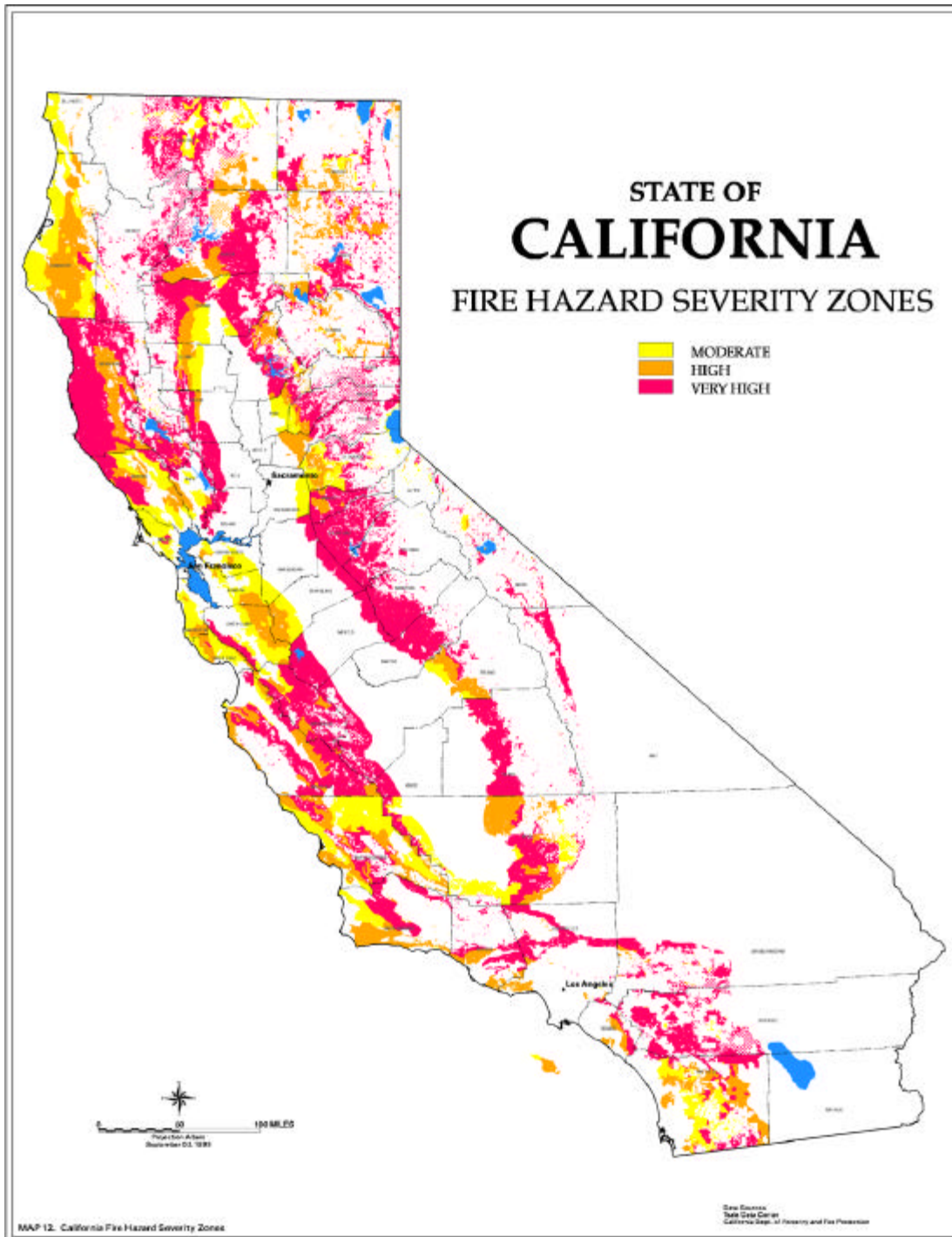


Figure 3.2 – State Responsibility Area Fire Hazard Severity Map

### 3.2d. Fire Safe Standards

With increasing development in the Urban-Wildland Interface, the 1980's and 1990's have shown Californians some of the most devastating wildfire damage ever experienced in the state. Nearly 1,500 structures in the 1980's and over 6,000 structures in the 1990's were destroyed by wildfires that encroached on Urban/Wildland Interface populations. California lawmakers were compelled to help mitigate these losses in the future. As a result of this dramatic increase in damages, related legislation began to emerge to address these problems directly. In 1991, Senate Bill 1075 (Rogers) passed, enacting minimum fire safety regulations in the SRA through [PRC Section 4290](#). Senator Rogers first introduced this bill in 1987. It was an attempt from a different angle to mandate fire safe land use planning where fire protection was under state jurisdiction. These lands were experiencing extensive rural and wildland development which needed to be managed to avoid undue loss from wildfire. However, these lands were and still are under local agency jurisdiction for the purpose of development and land use planning. Through SB 1075 and associated public hearings, the requirements found in PRC 4290 were enacted. The regulations are intended for the purpose of protecting natural resources from out-of-control structure fires, but it is important to note that they also serve to protect structures from wildfire at the same time. The regulations address several major elements of land use, development, and construction:

- Vegetation clearance around structures standards



**Figure 3.3 – Vegetation Clearance**



**Figure 3.4 – No Vegetation Clearance**

- Road and access standards



**Figure 3.5 – Safe Fire Equipment Access**



**Figure 3.6 – Unsafe Fire Equipment Access**



- Signage and building identification standards



**Figure 3.7 – Street Sign**



**Figure 3.8 – Building Address**

- Fuel break and greenbelt standards

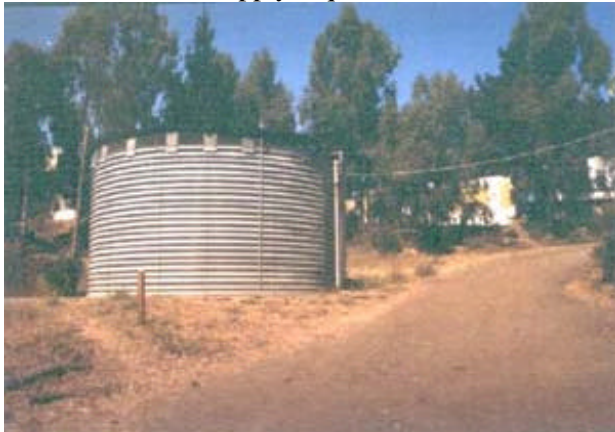


**Figure 3.9 – Fuel break**



**Figure 3.10 – Greenbelt**

- Private water supply requirements



**Figure 3.11 – Water Supply Tank**



**Figure 3.12 – Swimming Pool Source**

The detailed fire safety standards adopted by the State Board of Forestry pursuant to PRC 4290 can be found in Title 14 of the California Code of Regulations, especially [Sections 1270-1276](#). Unless a county received certification of another ordinance through the State Board of Forestry prior to September 1, 1991, these regulations took effect as minimum standards in the SRA. They are triggered by application for a building or use permit for any non-existing structures, roads, or driveways being constructed in a state responsibility area. If they are not adopted by local ordinance, they are enforceable by default. However, identification of the enforcing entity remains a quandary. In these areas, code enforcement questions still arise that are not answered sufficiently by either local fire district personnel or local Ranger Unit personnel.

### **3.2e. Periodic Review**

CDF is responsible to periodically review zones designated and rated according to SRA fire hazard zoning regulations and, as necessary, to revise zones or their ratings or repeal the designation of zones. Any revision of a zone or its rating or any repeal of a zone must conform to the requirements of [PRC Section 4203](#), which requires local public hearings ([PRC § 4204](#)). The same confusions about CDF and local government roles also apply in regard to periodic review, then, since local ratification of CDF recommendations must still occur.

## **3.3 LOCAL LAND USE PLANNING RESPONSIBILITIES**

*“Fires are extremely costly, not only to property owners and residents, but also to local agencies. Fires pose a serious threat to the preservation of the public peace, health, or safety. Since fires ignore civil boundaries, it is necessary that cities, counties, special districts, state agencies, and federal agencies work together to bring raging fires under control. Preventive measures are therefore needed to ensure the preservation of the public peace, health, or safety.... The prevention of fires is not a municipal affair..., but is instead, a matter of statewide concern.”* (Government Code § 51175)

Local governments have a responsibility to regulate planning and development in consideration of local and regional public safety. Moderate, High and Very High fire hazards exist throughout the state, and fire knows no boundaries. As a result of this knowledge and in response to repeated, costly disasters, the California legislature has attempted to mandate certain minimum requirements for development and maintenance of fire hazardous areas. The first logical steps in this process would be to assess and classify the hazards present in a given area, then enact the appropriate zoning and development requirements in that area based on the hazards and risks identified. It sounds easy enough, but this process has proven problematic, since one must overcome several political hurdles to make such a legal designation. But these areas do contain substantial hazards and risks that must be acknowledged and mitigated. However, developers, local planners and residents all have a vested interest in maintaining a low profile when it comes to fire and other natural hazards, since it is perceived that such distinctions provoke negative reactions by real estate buyers and insurance companies.

### **3.3a. Hazard Assessment and Classification**

In accordance with [Assembly Bill 337](#) (Bates), passed in 1992, CDF was required to identify and classify fire hazards in the LRA. Though this classification was referred to in the legislation as an identification of “[very high fire hazard severity zones](#)” (VHFHSZ), it was not technically “zoning,” since all land use planning decisions in the LRA are still under the local agency’s jurisdiction. Therefore, the use of the term VHFHSZ in the legislation served to confuse the agencies involved as to who was responsible for local fire hazard assessment, classification and zoning. This section will attempt to clear up any confusion about this issue.

After the Oakland/Berkeley Hills Tunnel Fire (and the disasters experienced in earlier years), state lawmakers then felt the time was appropriate to enact statewide fire safety measures in the LRA, so Assembly Bill 337 (Bates) was drafted and passed. The new state law mandated LRA fire hazard assessment and zoning, and included related minimum fire safety standards to be adopted at the local level (see Government Code § 51175-51189).

The Department of Forestry and Fire Protection was assigned the task of identifying VHFHSZ in the LRA based on present fire hazards, including fuels, weather, topography and structure density. This task was undertaken in cooperation with local agencies. A protocol was developed, along with a [Criteria and Factors](#) review sheet, then topographical maps of each county were reviewed and signed off by Ranger Unit personnel and local fire protection officers once any VHFHSZ had been identified. These reviews took place in late 1994 and throughout 1995. A resulting set of digitized maps are available in print form to the local agencies through [Teale Data Center](#) for an average cost of \$35, plus shipping and handling, if they wish to obtain them. These LRA VHFHSZ maps are also available on the Internet at <http://www.ceres.ca.gov/planning/nhd>.

### **3.3b. Public Notification**

Local agencies containing VHFHSZ must make available to the public within 120 days of notification by CDF. The information presented to the public must be in an easy to understand format, including, but not limited to, maps ([Government Code § 51179](#)). Those local jurisdictions that contain one or more VHFHSZ were notified in writing by CDF of the identification and were alerted to the 120-day deadline for public notification. Any updates conducted by local agencies would fall under the same public notification requirements.

### **3.3c. Designation of Hazard Areas**

According to Government Code §51179, enacted by the Bates bill, local agencies can accept or reject the CDF VHFHSZ assessment and delineation. Local agencies can also alter and update VHFHSZ boundaries as deemed necessary. Approximately fifty-two jurisdictions with areas that otherwise would have been identified with a VHFHSZ had claimed to meet or exceed the requirements of AB 337 at the time of the original assessment review in 1994 and 1995. Some have provided appropriate documentation of the minimum standards, while others have not. These jurisdictions were not required to designate a VHFHSZ because Government Code Section 51179 reads, “*A local agency shall be exempt from this requirement if ordinances of the local agency, adopted on or before December 31, 1992, impose standards that are equivalent to, or more restrictive than, the standards imposed by this chapter.*” This means that any jurisdiction that already had vegetation clearance regulations that were equal to or more stringent than [GC 51182](#), plus a Class B roofing minimum, could essentially ignore the VHFHSZ recommendations made by CDF. As a result, true hazards throughout the state were not necessarily identified pursuant to AB 337. In fact, there are many areas in the state of California that qualify, according to several different hazard assessment systems, as VHFHSZ. Local jurisdictions with a VHFHSZ identified by CDF but not recognized locally are nevertheless subject to Natural Hazard Disclosure requirements (see [Section 4](#)), even though they may not enforce the associated defensible space and roofing requirements.



For example, no VHFHSZ appear on the Alameda County map, even though all of the conditions exist to qualify certain areas as VHFHSZ. Unfortunately, the hazard assessment system developed because of the Bates bill was not applied effectively throughout the state, resulting in non-identification of certain hazardous areas. This problem could be rectified with updated assessments of hazards by local jurisdictions and with proactive zoning conducted by local governments.

This graph demonstrates levels of local agency compliance with fire safe codes in and out of VHFHSZ.

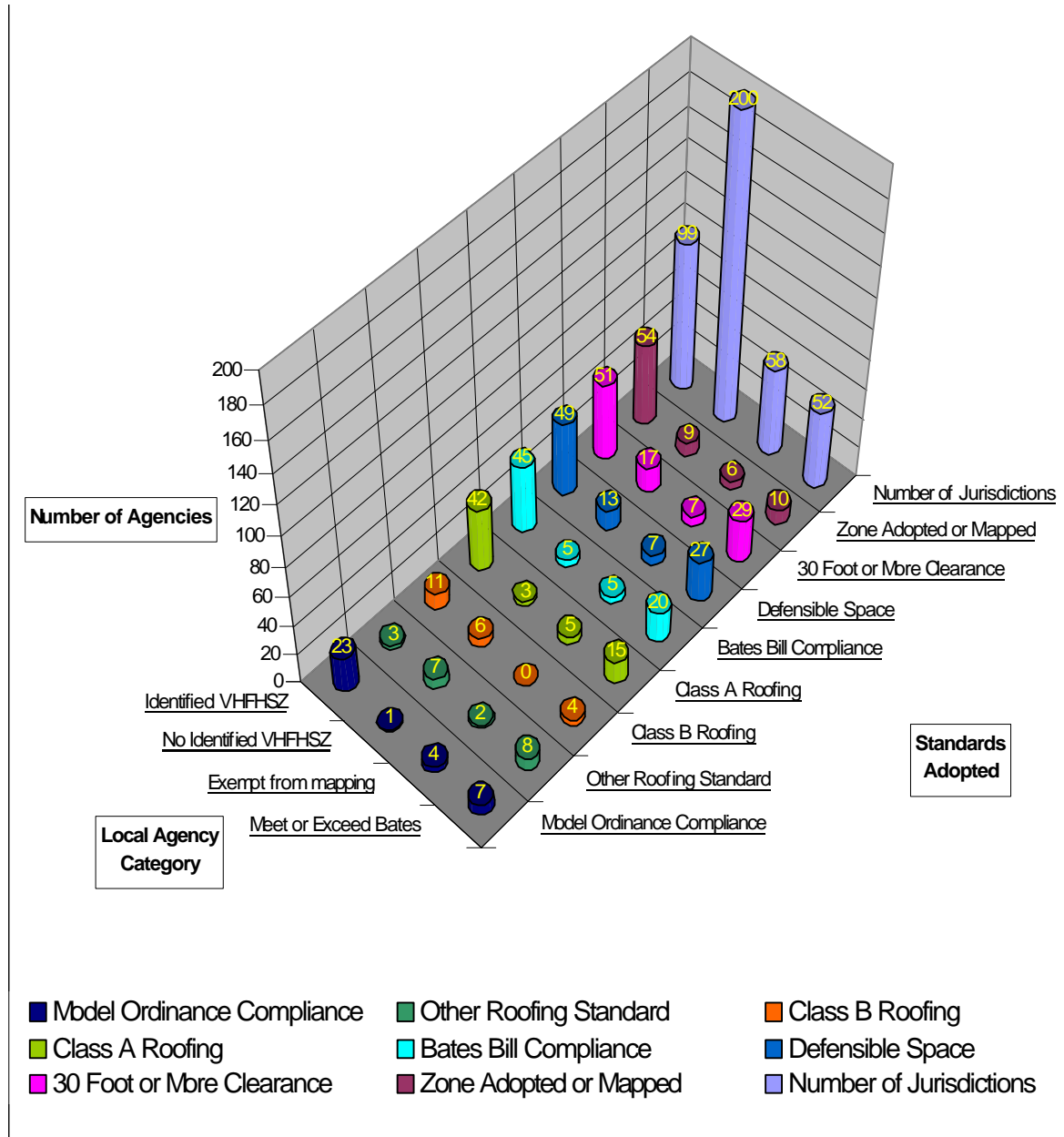


Figure 3.13 – Local Agency Fire Safe Code Compliance

### 3.3d. Fire Safe Standards

The vegetative clearance and structural requirements enacted in GC 51182 via AB 337 match the regulations of PRC 4291, which had been effective in the SRA since 1985. AB 337 also included a minimum Class B roofing requirement pursuant to [Health and Safety Code section 13108.5](#), which was cross-referenced to [PRC 4201](#) and [GC 51178](#), so that roofing regulations would be applicable in the LRA and the SRA. The logic behind this new roofing minimum requirement was that the areas that were being rated tended to be in moderately to densely populated areas. An ignition-resistant roof covering could mean a significant reduction in the probability and rate of fire spread from house to house via [firebrands](#).

It was only a matter of time before state lawmakers mandated additional fire safety regulations in VHFHSZ, which could be one reason some LRA agencies did not participate in the original hazard assessment. During the implementation of the AB 337 assessment reviews by CDF and the local agencies, a series of severe fires now known as the Southern California Firestorm occurred in 1993. In the aftermath of this disaster, which destroyed 1,171 structures, House Speaker Willie Brown authored [Assembly Bill 3819](#). This new law addressed the roofing requirements in not only LRA VHFHSZ per GC 51178, but also in SRA areas rated as High and Very High fire hazard severity per PRC 4201. AB 3819 increased the roofing requirements in these areas to Class A via [Health and Safety Code 13132.7](#), and to Class B in all other areas of the state, special circumstances excepted. The legislation also required that the [Office of the State Fire Marshal](#) develop and adopt a [Model Ordinance for the Defensibility of Space and Structures](#), which could be used by local authorities as an example of a typical and desirable set of pre-fire safety regulations to be adopted and enforced at the local level. Any jurisdiction which enacted (or already had) local regulations in substantial compliance with the Model Ordinance was exempted from the Class A roofing requirement, and could retain minimum Class B roof coverings throughout its jurisdiction, ostensibly since many other fire safe tactics would already have been employed there.

Due to the fact that many jurisdictions were exempted from the AB 337 mapping project for various reasons, a number of jurisdictions to which AB 3819 was meant to apply had not adopted zones as recommended by CDF per [GC 51178](#) (AB 337). Hence, the new Class A roofing requirement would not be enforced in the exempted and undesignated areas via this code. Technically, all areas with a designated VHFHSZ should comply with this model ordinance in its entirety, but compliance has been far from swift and less than total to date. Local jurisdictions can reserve the right to adopt standards equally or more stringent than those written into California law. Unfortunately, concerns regarding insurance coverage, vegetation management costs, and disposal issues have hindered progression of fire hazard zoning laws and enforcement. These issues are discussed in more detail in the other reports prepared by the [University of California Forest Products Laboratory](#) (UCFPL) for the [Federal Emergency Management Agency](#) (FEMA) and the [Office of Emergency Services](#) (OES) under the [Fire Hazard Mitigation Grants Program](#), and in other volumes in the [I-Zone Series](#).

In 1995, Assemblywoman Valerie Brown's [AB 747](#) took the roofing requirements yet one step further. This bill's passage essentially outlawed the use of wood roofing on any new structure or on a re-roof of 50% or more of the roof area of any existing structure in the entire state of California. Its built-in timeline specifies the only avenue by which a roofing manufacturer may comply with the ten-year wood shake shingle testing procedure in order to receive approval as Class A or B. This legislation may, unfortunately, place too much emphasis on the type of roof covering and too little emphasis on the roof assembly, which includes the underlying paper, plywood, and eave assemblies. Banning untreated wood shakes alone does not necessarily create fire-resistant roofing. This issue is discussed in much more detail in other reports prepared by the UCFPL, which address [structural ignition potential](#).

Assembly Member Dutra introduced new roofing regulations in February 1999 via [Assembly Bill 423](#). The bill, which became law January 1, 2000, updates fire-retardant roofing regulations as they occur throughout California. Previously, these regulations were only triggered by new construction or a repair or re-roof of at least 50% of the total roof area. This bill alters these requirements such that fire-retardant roofing regulations would be triggered by *any* repair or alteration of the roof covering, specifying that fire-retardant roofing must be used even in small repair jobs if the structure is located in a designated hazard zone. Additionally, if 50% or more of the roof covering is replaced within any one year period, AB 423 states that the *entire* roof covering must be replaced with fire-retardant materials as specified. The new law also addresses the fact that the [State Insurance Commissioner](#) must accept these regulations in connection with “replacement cost” insurance policies. The main purpose of this legislation, though, was to clarify the roofing regulations such that the “50% loophole” is removed, in order to circumvent use of non-fire-retardant roof coverings through partial re-roofs and small repairs.

For more information on roofing requirements in California, all of these regulations can be found in [Health and Safety Code §13108.5 and 13132.7](#).

### **3.3e. Periodic Review**

*“ The [CDF] director shall periodically review the areas in the state identified as very high fire hazard severity zones pursuant to this chapter, and as necessary, shall make recommendations relative to very high fire hazard severity zones. This review shall coincide with the review of state responsibility area lands every five years and, when possible, fall within the time frames for each county's general plan update. Any revision of areas included in a very high fire hazard severity zone shall be made in accordance with Sections 51178 and 51179” (GC § 51181).*

This CDF responsibility for a five-year review of LRA VHFHSZ was fulfilled via a document titled [Wildland Fire Hazard Assessment](#) (1999). The review was conducted by contacting local agencies, mainly those with identified VHFHSZ, to determine what local actions had been taken to comply with or improve on the requirements of AB337 (Bates). It has been determined by CDF that any future hazard re-assessment will be conducted statewide, so as to avoid inconsistencies that result from assessments conducted by county or by jurisdiction. This review indicated that not all VHFHSZ jurisdictions have complied with the state mandates. CDF does not play an enforcement role in state mandates that are meant to apply to LRA.

### **3.4. Updates of Classifications and Designations**

According to [GC 51179](#), a local agency has the right to accept, reject or modify the CDF VHFHSZ identification in its jurisdiction. As usual, any new recommendations would be subject to local ratification or rejection. As long as there is substantial evidence on the record to support local findings, local agencies can conduct their own hazard assessments, make their own classifications and designate hazard areas as they see fit. As a result, the role played by CDF in the LRA is merely informational. If a local agency decides to change or update the CDF recommendations, they must go through the steps outlined in [Government Code Sections 51175-51189](#), and they should notify the Board of Forestry, CDF and the public of any changes. These changes are not rebuttable by CDF or the Board, however, so such a notification is just a formality to keep state agencies informed of local actions.

Because there are so many local jurisdictions, all of whom can update and change their own VHFHSZ boundaries, it would stand to reason that an update of the original VHFHSZ maps by CDF could be considered futile.

### 3.5. Tools for Hazard Assessment

There are many other hazard assessment systems available and in use today. The [Department of Housing and Urban Development](#), [CDF](#), [ISO](#) and many other organizations have introduced different methods for different purposes. Below are described a few assessment systems that are comprehensive and comparatively easy to use. For detailed information on these and other hazard assessment options, please see the *Wildland Fire Hazard Assessment* publication of the *I-Zone Series*.

#### 3.5a. Bates Bill System

As described in Section 2 of this guide, the Bates bill (AB 337) was a direct result of the great loss of homes and lives in the Tunnel Fire of 1991 in the Oakland/Berkeley Hills. CDF, given the responsibility to carry out the state mandate, formed a working group to determine how to proceed. The group, comprised of state and local representatives, decided upon a system involving fuel, topography (slope), weather, and dwelling density as the foundation for the system, and added additional mitigation factors to adjust the score upward or downward. The raters (in almost all cases one local representative and one CDF or Contract County representative) had the opportunity to adjust the score down by one point for certain mitigation measures. They also had the option of increasing the score by one point for certain factors known to contribute to fire spread. To qualify as a [Very High Fire Hazard Severity Zone](#) (VHFHSZ), an area had to score 10 or more points. Potentially, the range of scores (including the mitigating factors) could range from a low of 1 to a high of 16.

This system uses a resolution of one square mile, with three fuel classes. The rater's instructions specify that no area under 640 contiguous acres (or one square mile) should be identified as a VHFHSZ. This limits VHFHSZ to areas that show a broad pattern of hazards over a significant portion of the land, excluding "island" areas within the LRA that are hazards in and of themselves, but that are not subject to the larger wildland interface threat.

The following criteria and factors developed under AB 337 for rating fire hazards in the LRA are easy to use and were developed by CDF with this in mind. The recommended system was given an extensive field test by different members of the working group, and was then implemented. A copy of the rating form is found on the following pages.

## CRITERIA

### CLASSIFICATION

### POINTS

**A. Fuel** (NFPA 299). For each zone a fuel hazard rating shall be assigned. Where fuel types vary within a zone, the rating assigned for the zone shall be that which best represents the predominant fuel type.

**Type**

- |  |    |
|--|----|
| 1. Small, light fuels (Grass, Weeds, Shrubs)                                     | +1 |
| 2. Medium fuels (Brush, Large Shrubs, Small Trees)                               | +2 |
| 3. Heavy fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) | +3 |

**B. Topography—Slope** (NFPA 299 and FEMA). For each zone a Slope Hazard Rating shall be assigned. Where slopes vary within an area, the rating for the area shall be that which best represents the predominant slope range.

- |  |    |
|--|----|
| 1. Flat to mild slope (0-9.9%)         | +1 |
| 2. Mild to Medium Slope (10-19.9%)     | +2 |
| 3. Medium to Moderate Slope (20-39.9%) | +3 |
| 4. Moderate to Extreme Slope (40% +)   | +4 |

**C. Dwelling Density** (1991 Census or a local ordinance with higher standards). For each zone a dwelling rating shall be assigned. A check with each area for local ordinances regarding dwelling density must be accomplished before setting this factor.

- |   |    |
|---|----|
| 1. Low (less than one structure per 10 acres) | +1 |
| 2. Medium (one structure per 5 to 10 acres)   | +2 |
| 3. High (one structure per 0 to 5 acres)      | +3 |

**D. Weather** (instructions for zoning fire hazard severity in State Responsibility lands in California). The ratings (EXH 1) show what each county is rated. This information is obtained for each county by using the Burning Index (BI). Weather is a major part of the BI system. The information for developing BI systems came from weather stations throughout the state.

- |              |    |
|--------------|----|
| 1. Moderate  | +1 |
| 2. High      | +2 |
| 3. Very High | +3 |

By adding the highest number for the four factors, you will have a total of 13 points. The point spread between ten (10) and thirteen (13) points represents the combination of factors needed to make up a Very High Fire Hazard Severity Zone.

*Continues on next page*

## MITIGATION MEASURES

These mitigation measures are points, plus or minus, that a local agency may use to mitigate a rating within its area, and could cause a higher or lower rating for the benefit of the local agency.

### FACTORS—MINUS

### POINTS

- |   |    |
|---|----|
| 1. Infrastructure—meets or exceeds minimums of ISO 8, NFPA 1231, PUC 103, or PRC 4290   | -1 |
| 2. Housing or roofing ordinances (Class A, B, or better roof), sprinklers required, firesafe construction fuel modification, local option | -1 |
| 3. PRC 4291 Ordinance or better (Natural Resource Protection)   | -1 |

### OTHER FACTORS—PLUS

- |   |    |
|---|----|
| 1. Rough topography with steep canyons or draws that would impede responding personnel and equipment.   | +1 |
| 2. Area with a history of high fire occurrence, related to surrounding areas, because of heavy lightning, railroad fires, debris burning, arson, etc.             | +1 |
| 3. Area subject to severe fire weather such as strong winds and lightning, and has constant seasonal weather patterns that contribute to increased fire activity. | +1 |
| 4. Heavy concentration of flammable ornamentals or vegetation introduced by humans.   | +1 |

**TOTAL POINTS** \_\_\_\_\_

**VERY HIGH FIRE HAZARD SEVERITY ZONE ? YES / NO**

### DESCRIPTION OF ZONE:

1. LATITUDE AND LONGITUDE \_\_\_\_\_
2. TOWNSHIP, SECTION, RANGE \_\_\_\_\_
3. NARRATIVE OF ZONE \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

DATE \_\_\_\_\_ SIGNATURE OF RATER \_\_\_\_\_



This rating system is reasonable, and could be adopted in most of California, with or without minor modifications. These might include reducing the minimum size of the area rated from 640 acres to perhaps 320 acres or even smaller, such as a subdivision. The weather component could be adjusted to reflect local conditions rather than countywide conditions, which in some cases result in coastal areas rated too high and other areas too low. The fuel types on the rating form are easy to determine using the descriptions provided. The slope percent may require some field work with an abney or other device, or one could locate a county map showing these slope classes through the USGS, one's county or local planning department, or on the CDF home page (<http://www.fire.ca.gov>). Ordinances for adoption of state mandates are found in the Appendix.

In summary, the Bates System with or without modification does work, and has the advantage of being applicable statewide. A disadvantage is that a large number of local agencies decided not to acknowledge it. This means that the actual number of Very High Fire Hazard Severity Zones should be much higher than the number identified as part of the original Bates review. If fuels, topography, and weather with these criteria could be mapped using remote sensing to assure objectivity and accuracy, this system could produce a much more effective hazard assessment. The information could then be used by local agencies, perhaps with additional criteria, to achieve hazard maps that are useful to individual jurisdictions.

### **3.5b. Fire Hazard Zoning Working Group System**

The Working Group assigned to the Fire Hazard Zoning grant project evaluated the above and many other assessment systems and synthesized them into one system they feel can be applied most effectively throughout the state, with whatever local modifications are needed. Below are sample hazard assessment maps developed using the Working Group's system. The group was established in 1997 and was comprised of personnel from state, federal, and local agencies with varying fire protection responsibilities. The following section outlines their findings and recommendations relative to a single, adaptable system.

The GIS based fuel ranking and validation process described under the Fire Plan System is the starting point for the fire hazard zoning project coordinated by the State Fire Marshal's Office, and developed by the Working Group. The project proposes to combine the effects of fuels, topography (elevation, slope, and aspect) and weather. The current California State Fire Plan fire hazard mapping system and this system are both summarized to grid cells equaling approximately 450 acres (Q81) from the USGS topographical maps. Each Q81 is limited to one fuel model, whichever is most prevalent. This helps to ensure that the final map will be a manageable, cohesive product that can give an accurate picture of significant fire hazard patterns throughout the state, rather than just a detailed representation of fuel model existence. A product such as this, showing broad patterns along with moderate detail in mixed areas, can be a useful planning tool for fire prevention and protection agencies trying to allocate resources and enforce mitigation standards.

The following bullet points summarize the proposed process.

- An “Elevation Component” is developed in the GIS where a relative intensity score is assigned to each of six elevation classes. This component is designed to reflect the fact that similar fuels in higher elevations will generally burn with less intensity than those same fuels at lower elevations.

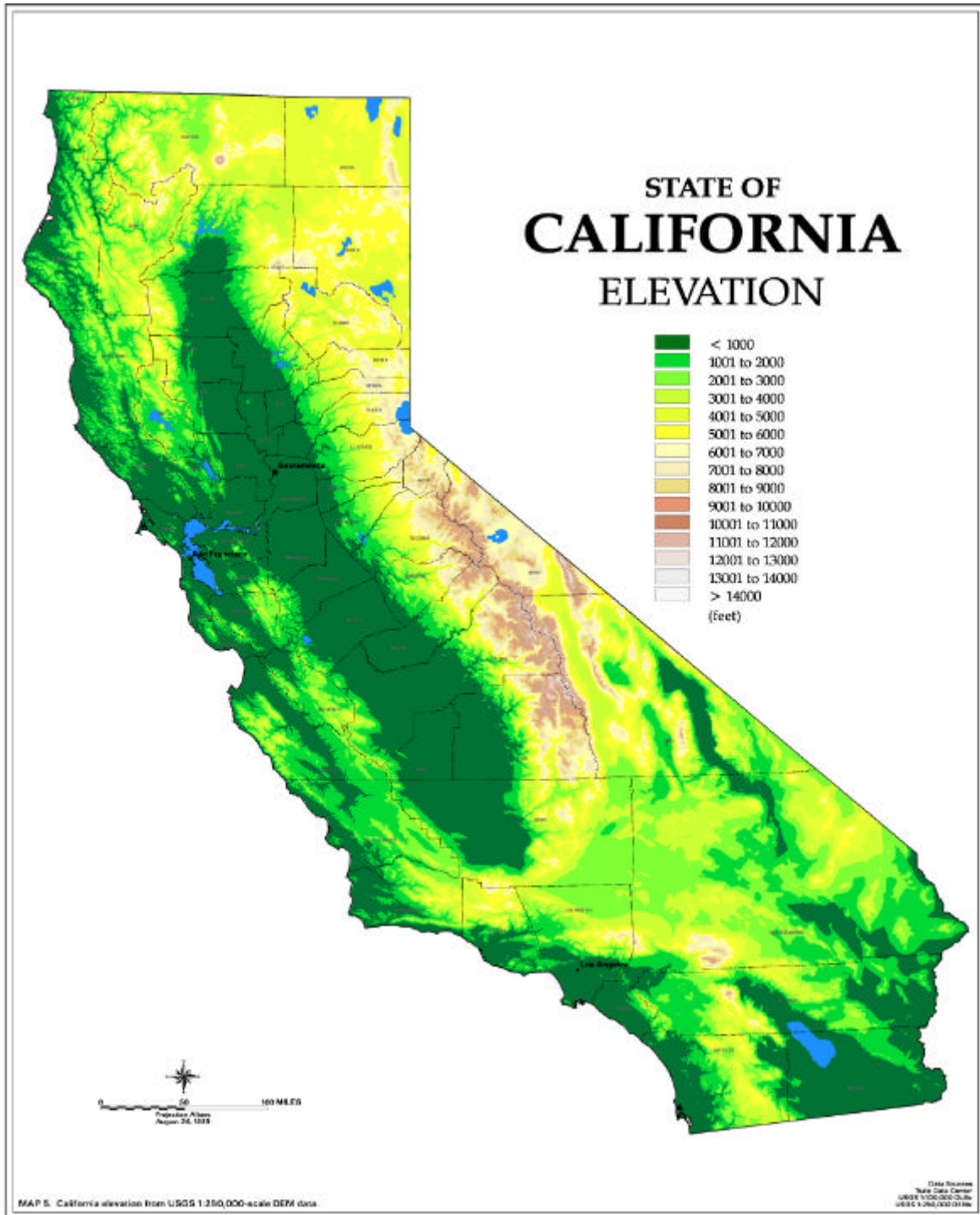


Figure 3.15 – Working Group Elevation Map

- Secondly, an “Aspect Component” is developed reflecting the differing burning characteristics attributed to aspect. For example, the south slope usually burns with more intensity than north slopes due to the increased exposure of fuels to daytime radiant heating. Relative scores are assigned to each aspect.

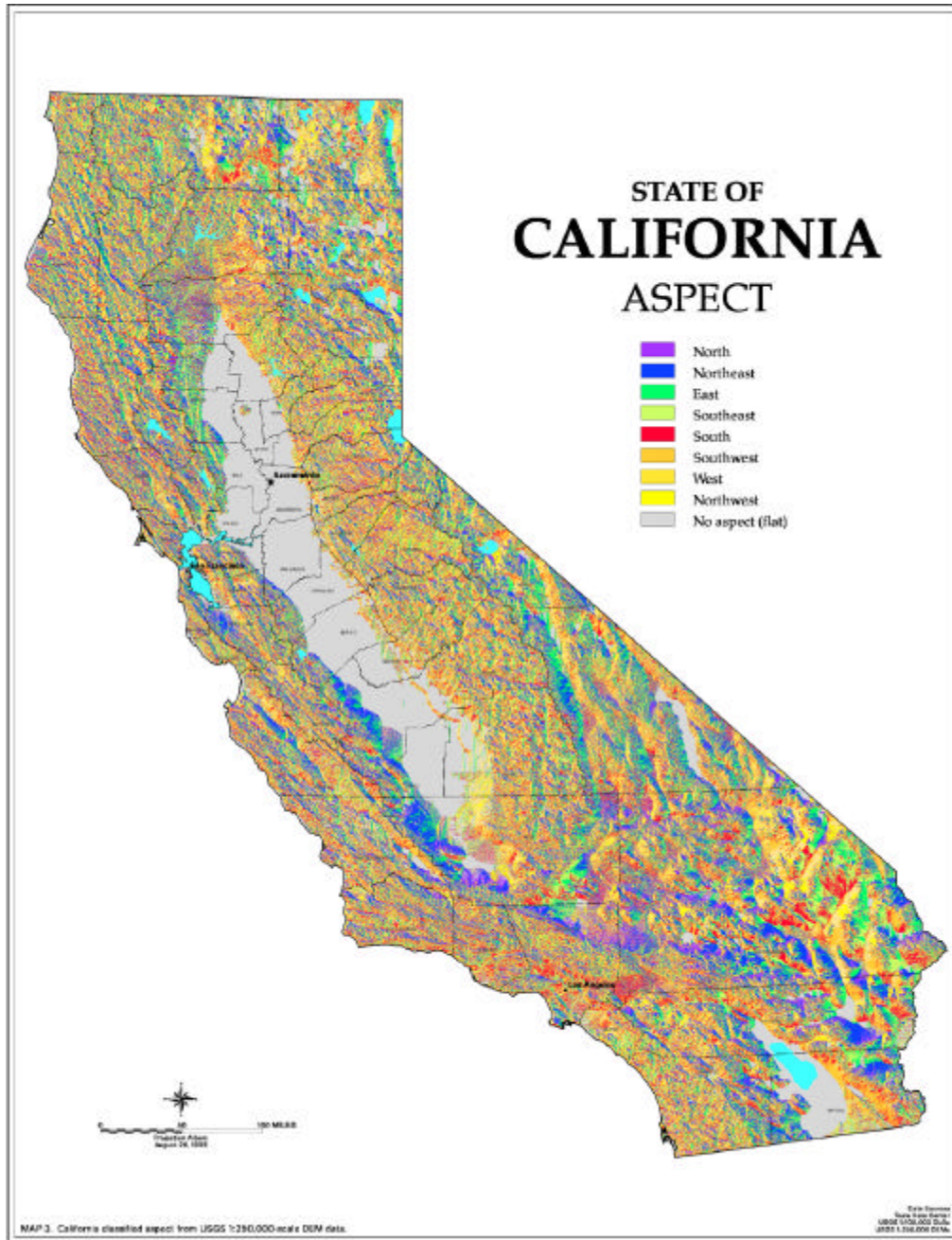


Figure 3.16 – Working Group Aspect Map

- Slope is the third component developed in the GIS used to evaluate burning intensity. As slope increases, a fire's rate of spread and intensity will increase. Each slope class is given a score to reflect it's relative intensity.

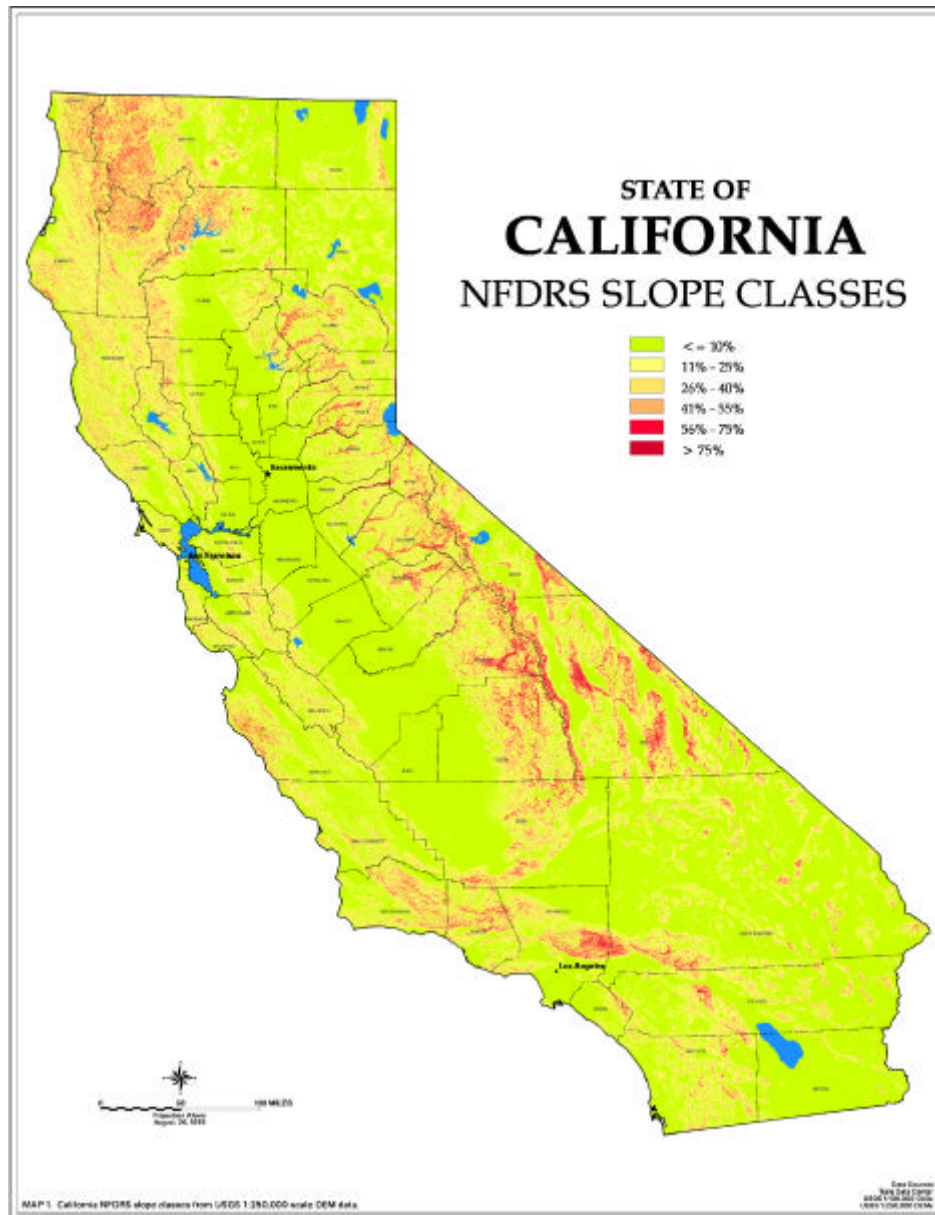
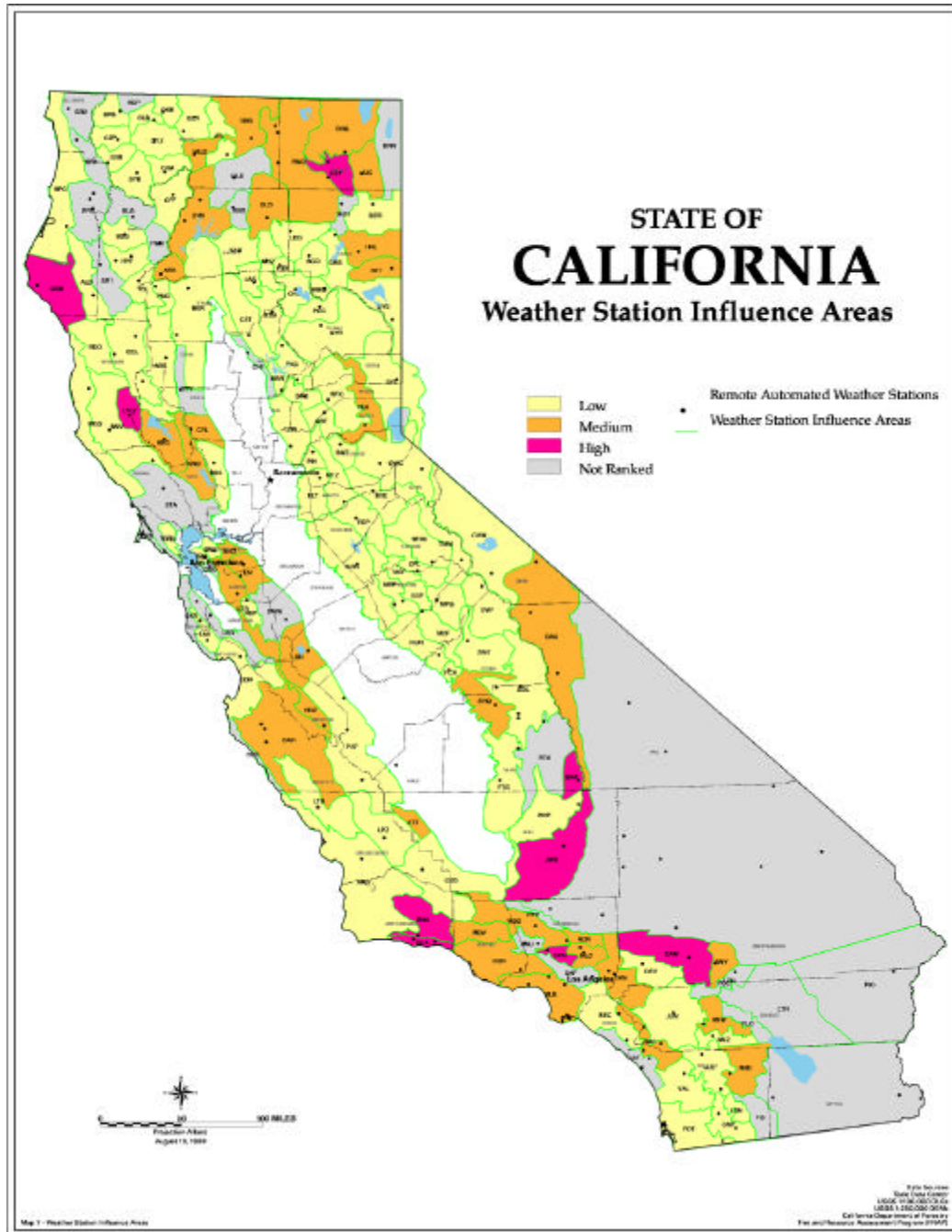


Figure 3.17 – Working Group Slope Map



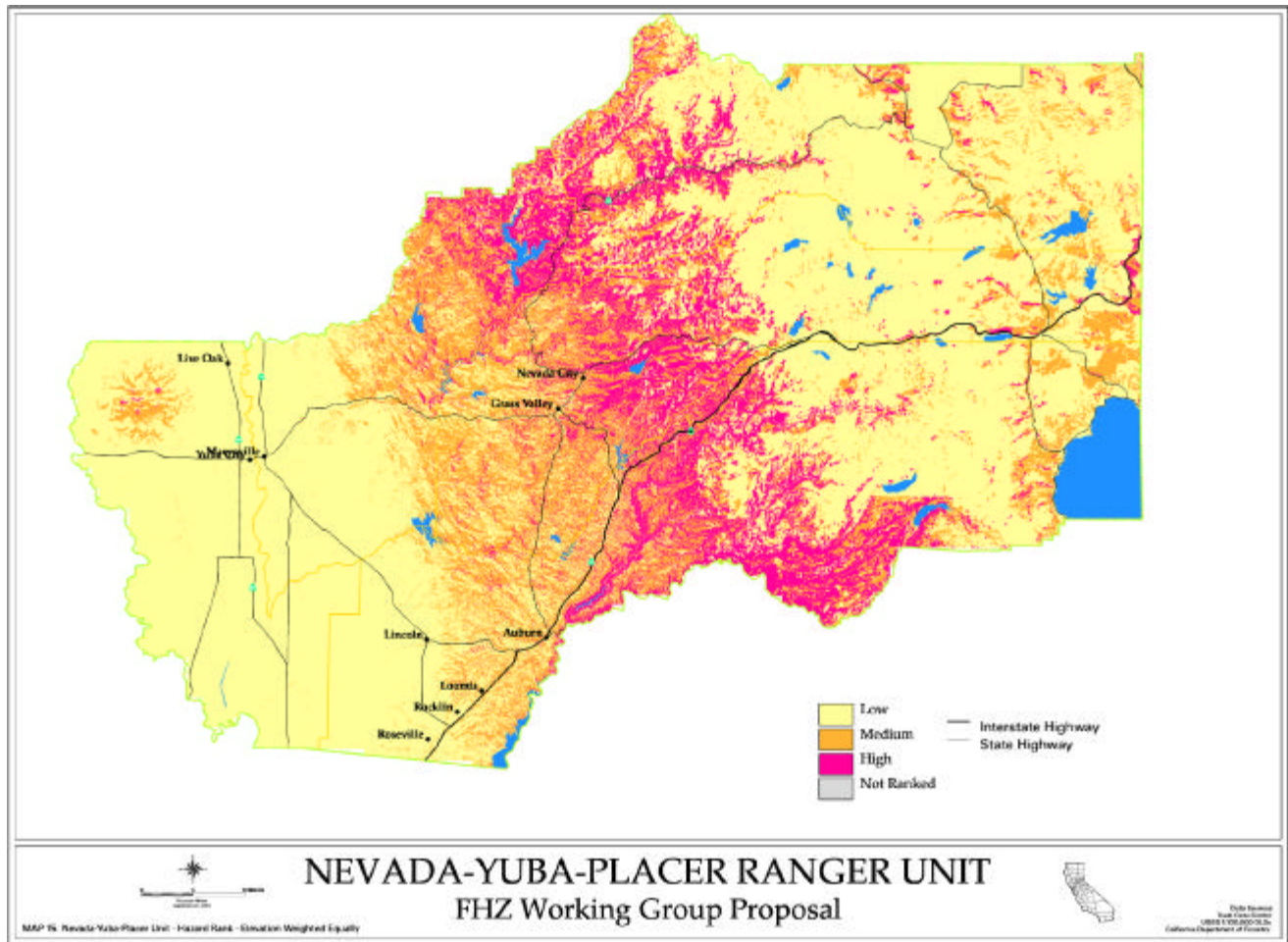
- Finally, a frequency of severe weather rating based on the number of severe weather days reflected by hourly weather data collected at RAWS (Remote Automated Weather Stations) for each area is calculated



**Figure 3.18 – Working Group RAWS/Weather Score Map**

The above-described ranked values for elevation, aspect, slope, and severe weather frequency are averaged, resulting in each Q81 receiving a final “Weather Score”. This score reflects expected relative burning intensities based on weather related topographic features.

The “Severe Fire Weather” score is then combined with the “Fuel Hazard Assessment” to create the final “Fire Hazard” matrix. The “Fire Hazard” matrix is then ranked and each Q81 cell is assigned a value of 1, 2, or 3. These numbers reflect the respective fire hazard of Moderate, High, or Very High. The final output of the process is a map showing the relative fire hazard at a scale of 450 acres

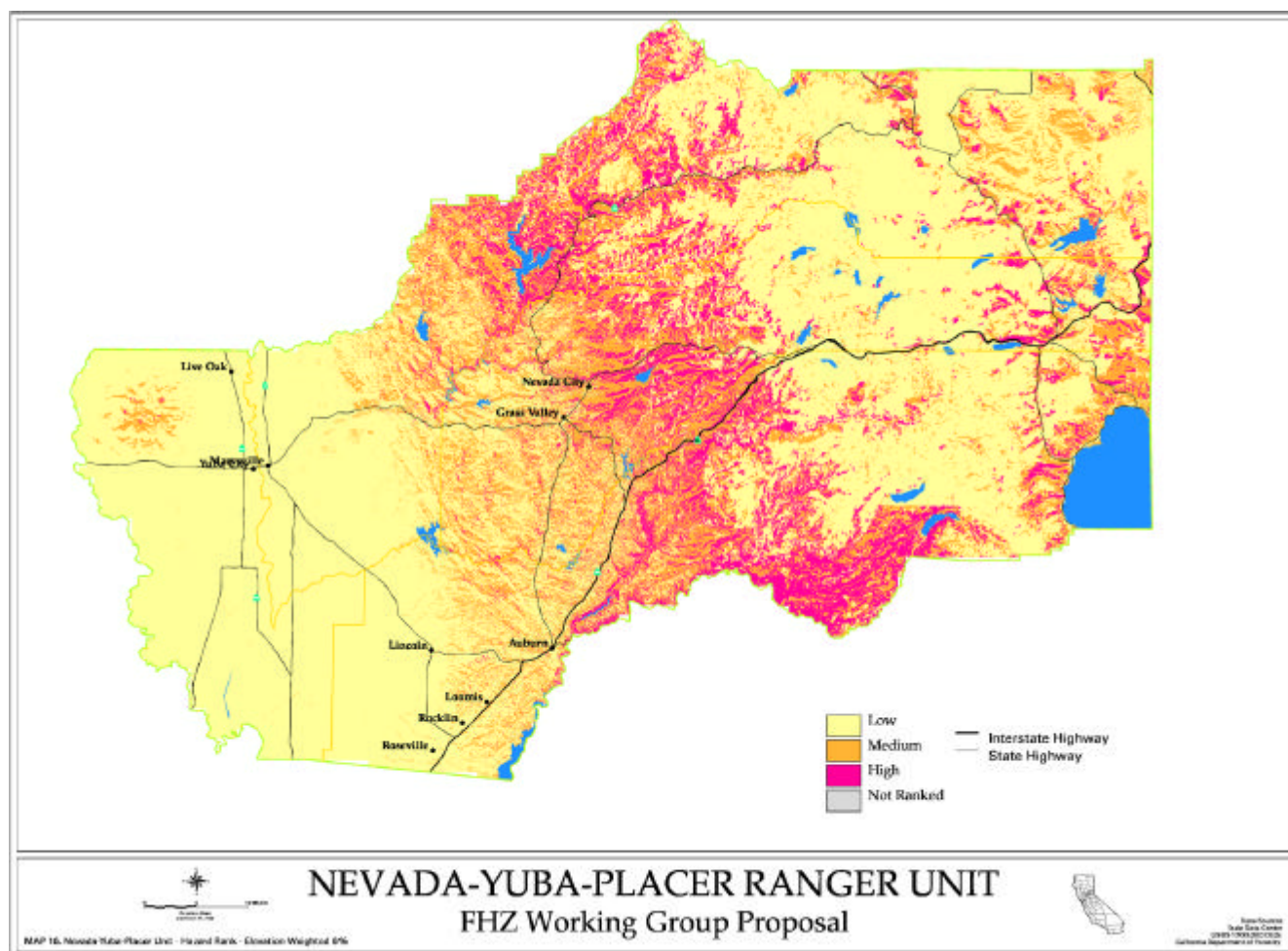


**Figure 3.19 –Working Group Fire Hazard Severity Map**

The process summarized above combines the best available GIS data sources with [California Fire Plan](#) methodologies, including the use of local Ranger Unit personnel and local stakeholders to validate data. This statewide computer-based process minimizes differing interpretations of data and insures the continuity, consistency, accuracy, and usefulness of the Fire Hazard Map.

Comments received on the draft that follows focused mainly on whether elevation should be given equal rating with the aspect and slope components. Everyone agreed that it should have a lower rating than the other elements. A test map has been produced to see what the different elevation rating might do to the results. This map is shown on the following page.





**Figure 3.20 – Working Group Fire Hazard Severity Map (Elevation Weighted 6%)**

The change in elevation weighting has affected the hazard map. Over the large pink area, the 6% weighted elevation component has produced a more refined depiction of the hazards present. Whether or not this refinement is relevant to the overall hazard assessment would be best decided by the local officials using the map, depending on its various purposes. It does seem, however, that the lower weighted elevation will more accurately reflect the other hazards (topography, aspect, fuels and weather), since a fully weighted elevation component might result in a high fire hazard assessment for areas of high elevation that might otherwise qualify as low or moderate fire hazards.

For more detailed information about the Fire Hazard Zoning Working Group's fire hazard assessment system, see Chapter IV of [Wildland Fire Hazard Assessment](#).

### 3.5c. Brian Barrette's System for Rating Structural Vulnerability

While the CDF is not charged or mandated to provide structural protection, some of the fastest growing areas in California are protected by CDF, and providing structural protection often becomes the first priority when a wildfire occurs. Local units have usually developed own ratings for areas, and some have at least mentally decided whether a particular house, group of houses, or subdivision is defensible. The Bates system of rating LRA is one option for rating a particular area. Another option is to use the following system, which was developed by Brian Barrette, who was also a major contributor to the work done under the Bates bill, which is described elsewhere in this guide.

The system takes into account the three standard rating factors of fuel, weather, and topography by starting with the SRA fire hazard severity rating as determined using the SRA hazard assessment system described earlier in this chapter. This system further focuses on individual structures by also rating factors such as roofing, siding, vegetation clearance, roads and signage, chimneys, structural accessories, water supply, and the location of the structure in relation to the surrounding conditions. Intended for use in assessing survivability of structures on individual parcels, this system uses factors most known to affect structural ignition and loss. The system could also be used in conjunction with larger-scale assessments, or could be based on a base hazard rating achieved through a separate assessment system. The system is as follows:

	Points
<b>1. SRA FIRE HAZARD RATING</b>	
Very High	6
High	4
Medium	2
<b>2. ROOFING COMPOSITION</b>	
Untreated Wood	3
Treated Wood	2
Composition or Other Fire Resistant Material	1
<b>3. SIDING</b>	
Wood	3
Combination	2
Stucco/Brick	1
<b>4. VEGETATION CLEARANCE</b>	
Less than 30 feet; tree limbs closer than 10 feet to roof; dead branches near roof; leaves on roof	3
Two or three of above present	2
Meets all Firesafe Standards	1
<b>5. ROADS AND SIGNAGE</b>	
Steep; narrow; poorly signed	3
One or two of the above	2
Meets all requirements	1
<b>6. CHIMNEYS</b>	
No Screen	3
Screened	2
No Chimney	1

- |    |   |   |
|----|---|---|
| 7. | <b>OTHER ITEMS</b>  |   |
|    | Wooden deck; stacked firewood nearby; propane tank close by | 3 |
|    | One or two of the above                                     | 2 |
|    | None of the above   | 1 |
| 8. | <b>WATER SUPPLY</b>   |   |
|    | None, except domestic                                       | 3 |
|    | Hydrant, tank, or pool over 500 feet away                   | 2 |
|    | Hydrant, tank, or pool within 500 feet                      | 1 |
| 9. | <b>LOCATION OF STRUCTURE</b>                                |   |
|    | At top of steep slope with brush or grass below             | 3 |
|    | Mid-slope with clearance                                    | 2 |
|    | Level with lawn, or watered groundcover                     | 1 |

### VULNERABILITY RATING

<b>VERY VULNERABLE</b>	21-30 Points
<b>VULNERABLE</b>	16-20 Points
<b>NOT VULNERABLE</b>	10-15 Points

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This is a system for rating the vulnerability of a structure in the event of an approaching wildfire. This system is not necessarily intended for use in mapping and does not address resolution. It can be used by individual homeowners with little to no knowledge of fire science, fire behavior, or building standards in order to determine whether their property is a good candidate for a fire hazard mitigation plan. This system is meant to be an "add on" system attached to SRA, Fire Plan, or other assessment systems that do not include structures and their vicinities as part of the base line criteria. It should be tested in SRA to see if it would be of value before actual adoption. This system can help the lay property owner perform a self-evaluation of his or her property and perhaps the surrounding properties as well. However, this system is only for determining immediate threats to a structure and not to an entire subdivision or region.

### 3.6. Hazard Assessment After the Fact

As stated above, local agencies can conduct their own hazard assessment projects if they see a need. The *Wildland Fire Hazard Assessment* (CDF 1999) analyzed various fire hazard assessment systems used in California and other states. Even though local agencies can conduct their own reviews, the most consistent hazard assessment project is one that ignores jurisdictional boundaries and identifies hazards regardless of where they are located. This would result in a more accurate statewide hazard assessment that could then be considered by all local agencies equally. However, the problem still remains that many local jurisdictions resist further action. In any case, political hurdles and sentiments still affect local fire hazard zoning.

## 4. NATURAL HAZARD DISCLOSURE FOR WILDFIRE

**Natural Hazard Disclosure** (NHD) for wildfire is a type of regulation that has resulted directly from fire losses in the Urban/Wildland Interface. It requires sellers of real property in [VHFHSZ](#) (LRA) and [Wildland Fire Areas](#) (SRA) to disclose to potential buyers that certain hazards exist in the area, and that the buyer may be subject to local laws requiring such things as vegetative clearance around structures and fire-retardant roofing. Buyers should be aware of these facts before purchasing property, resulting in this disclosure requirement. These regulations were first passed in the SRA (1989), then later in the LRA (1998). Since then the requirements have been synthesized (1999), and references to NHD for wildfire and other hazards can be found in the Public Resources Code, the Government Code and the Civil Code.

### 4.1. Wildland Fire Areas

Assembly Bill 1812 (Cortese) required Natural Hazard Disclosure for wildfire hazards in State Responsibility Areas (SRA) areas. This law was enacted in 1989, affecting [PRC Section 4136](#). It was proposed as a response to the destruction of 873 structures in wildfire conflagrations that year. Because Natural Hazard Disclosure had already been required for such hazards as earthquake fault zones and seismic hazards, the inclusion of wildfire in these regulations was a logical step in the disclosure process between buyers and sellers of real property. As specified on the official NHD form, this disclosure notifies a potential buyer of real property that the property is located in a wildland area subject to significant wildfire hazards. It further discloses when CDF has responsibility for fire protection.

This information must be disclosed for several reasons. One reason is that CDF's primary goal is natural resource protection. Also, many CDF fire stations are staffed only seasonally. This means that during certain times of the year first response will come from an alternate station farther away. Another reason is that a potential buyer must be notified that they are subject to the vegetation and structural maintenance requirements of [PRC 4291](#), such as creating 30-foot clearance around structures and installing screens on chimneys.

### 4.2. Very High Fire Hazard Severity Zones

Directly related to fire hazard assessment and zoning in the LRA is the passage of Assemblyman Torlakson's [Bill 1195](#) in 1998. This bill required Natural Hazard Disclosure (NHD) in LRA areas designated as a VHFHSZ mandated by the Bates Bill pursuant to [Government Code 51178](#). This requirement was "piggy-backed" onto the existing NHD requirements for SRA wildlands, earthquake, and flood hazards. The original bill for this purpose was titled AB 6X, which progressed through the Assembly with such ease that no member voted against it. Its implementation was delayed, however, until the passage of the similar AB 1195, which repealed [AB 6X](#). The effective date of the AB 1195 regulations was June 1, 1998. As a result of this legislation, the [Office of the State Fire Marshal and Teale Data Center](#) posted Natural Hazard Disclosure maps on the Internet in digital and picture formats, retrievable from various links such as [www.ceres.ca.gov/planning/nhd](http://www.ceres.ca.gov/planning/nhd).

A particular area of confusion has developed with the emergence of private sector industry firms that sell disclosures and maps. No express quality assurance (other than errors and omissions insurance and required engineering qualifications) exists for these firms, sometimes resulting in inaccurate disclosure information being disseminated. The CDF and Teale Data Center have publicized the original VHFHSZ identification maps as integrated with the SRA wildland maps for the sole purpose of providing NHD information to individuals who want information prior to sale, or who have been unable to locate maps

elsewhere. However, the LRA portion of these maps has always been subject to adoption or rejection by local agencies, so any firm that uses the CDF/Teale version of the maps for LRA NHD, without contacting the local agency to verify the boundaries, is likely to provide outdated or inaccurate information to its customers. Some of these companies are also still unaware that an SRA boundary update occurred in June of 1999. In addition, with the passage of [Assembly Bill 248](#) in September of 1999, which updates NHD requirements, even more information is now subject to error. These concerns should be addressed if the disclosure industry wishes to maintain compliance with state laws, and to provide their customers with accurate information.

Consequently, it is clear that although progress is being made in the arena of fire hazard zoning and code adoption and related safety measures, much remains to be done. Local implementation of these standards is increasing, but fully compliant jurisdictions are still in the minority. Cleanup legislation and new strategies for fire hazard assessment and zoning should be drafted, along with recommendations for funding and staffing the required local programs.

California is a wildfire culture, whether we like it or not. In order to adapt to our surroundings, we must take precautions and make [long-term plans](#) to reduce the risks we face in such an environment. No matter what Californians do, wildland fires will continue to happen. However, unlike other natural disasters, some wildfires are preventable. The question is, do we Californians have what it takes to save ourselves and our homes from this living threat? We have the tools: engineering, enforcement and education. Now let's use them together.